

15-112 Fundamentals of Programming

Lecture 4 – Language basics

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Carnegie Mellon Qatar

Let's work out a problem

- ❑ Write a program that reads current temperature from the user in Fahrenheit and prints the equivalent Celsius value.

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Another Example

- ❑ Write a program that reads an integer from the user and prints the sum of its digits.

Operations

- ❑ Bitwise operators
 - & (Bitwise AND)
 - | (Bitwise OR)
 - ^ (Bitwise XOR)
 - <<
 - >>

Bitwise Operators: Examples

- `6 & 5`
- `6 | 5`
- `6 ^ 5`
- `6 << 1`
- `6 << 2`
- `6 >> 1`

More Examples

- `print (1 << 2)`
- `a = 5`
`print (a & 4)`
- `print (5 ^ 7)`

Operator Precedence

- ❑ Operator precedence (highest to lowest):
 - **
 - Positive, negative, NOT (+x, -x, ~x)
 - *, /, %
 - +, -
 - >>, <<
 - & (Bitwise AND)
 - ^ (Bitwise XOR)
 - | (Bitwise OR)
- ❑ Operators with same precedence are processed left to right

Operator Precedence Examples

- ❑ `print (-2 ** 4 + 8 >> 2)`

Approximating Floats

What is the output of the following code?

```
d1 = 0.1 + 0.1 + 0.1
d2 = 0.3
print (d1 == d2)
```

ord and chr functions

- ord
 - A function that will return the ASCII value of a character
- chr
 - A function to convert ASCII value to character
- Examples!

Functions

- ❑ Function is a way of packaging a group of instructions that perform a specific task
- ❑ Functions abstract out the “what” from the “how”
 - When we use a function, we worry about “What” needs to be done and NOT “how” it will be done
 - When we write a function we worry about the “how”.

Functions that do something

- ❑ Some functions just perform a task

```
def doSomething() :  
    print("CMU Rocks!")
```

- ❑ How would you use this function

```
doSomething()  
doSomething()
```

Functions that act on input

□ Some functions perform a tasks on values that you give them

- printSquare – A function that takes a number and prints its square
- How will you use this function?

```
printSquare(2)
```

```
printSquare(3)
```

- How will you define this function?

```
def printSquare(x):
    print x, "**2 =", (x*x)
```

Function definition

```
def SomeName (Input parameters if any):
    Function Body
    Function Body
    Function Body
```

Using Functions

- ❑ A function has to be defined before it can be used!
- ❑ A complete example – funtest.py

```
def printSquare(x):  
    print x, "**2 =", (x*x)
```

```
printSquare(2)  
printSquare(3)
```

Functions - multiple parameters

- ❑ Functions can take several parameters

```
def printSum(x,y):  
    print x, "+", y, "=", x+y
```

```
printSum(2,3)  
printSum(3,4)
```


Functions with return values

- Functions can return values

```
def square(x):  
    return x*x  
  
print square(3)  
print square(4)  
a = square(3) + square(4)  
print a
```

A more complex example

- Write a program that reads the number of eggs bought by a customer and based on this input, determines how many cartons of eggs the customer would need. We can fit 12 eggs in one carton.

More Exercises

- ❑ `isEvenPositiveInt(x)`
- ❑ `isLegalTriangle(s1, s2, s3)`
- ❑ `rectanglesOverlap(left1, top1, width1, height1, left2, top2, width2, height2)`